

Amendments to the Specification

Please replace the first paragraph of page 1 of the specification with the following paragraph:

[0001] This application is a continuation of U.S. Patent Application Serial No. 10/188,069 filed July 3, 2002 and entitled Electrostatic Fluid Accelerator For And A Method Of Controlling Fluid Flow and is related to U.S. Patent Application Serial No. 09/419,720 filed October 14, 1999 and entitled Electrostatic Fluid Accelerator, now U.S. Patent No. 6,504,308, U.S. Patent Application Serial No. 10/175,947 filed June 21, 2002 and entitled Method of and Apparatus for Electrostatic Fluid Acceleration Control of a Fluid Flow, now U.S. Patent No. 6,664,741; U.S. Patent Application Serial No. 10/187,983 filed July 3, 2002 and entitled Spark Management Method And Device; U.S. Patent Application Serial No. 10/188,069 filed July 3, 2002 and entitled Electrostatic Fluid Accelerator For and a Method Of Controlling Fluid Flow; U.S. Patent Application Serial No. 10/295,869 filed November 18, 2002 and entitled Electrostatic Fluid Accelerator which is a continuation of U.S. provisional application serial No. 60/104,573, filed on Oct. 16, 1998; U.S. Patent Application Serial No. 10/724,707 filed December 2, 2003 and entitled Corona Discharge Electrode and Method of Operating Same; U.S. Patent Application Serial No. 10/735,302 filed December 15, 2003 and entitled Method of and Apparatus for Electrostatic Fluid Acceleration Control of a Fluid; and U.S. Patent Application Serial No. 10/752,530 filed January 8, 2004 and entitled Electrostatic Air Cleaning Device, all of which are incorporated herein in their entireties by reference.

Please replace paragraph [0023] with the following amended paragraph:

[0023] Figure 1A is a schematic diagram of an Electrostatic Fluid Accelerator (EFA) device 100 comprising two EFA stages 114 and 115. First EFA stage 114 includes corona discharge electrode 106 and associated accelerating electrode 112; second EFA stage 115 includes corona discharge electrode 113 and associated accelerating electrode 111. Both EFA stages and all the electrodes are shown schematically. Only one set of corona discharge and collecting electrodes are shown per stage for ease of illustration, although it is expected that each stage may include a large number of arrayed pairs of corona and accelerating electrodes. An important feature of EFA 100 is that the distance d_1 between the corona discharge electrode 106 and collector electrode 112 is comparable to the distance d_2 between collector electrode 112 and the corona discharge electrode 113 of the subsequent stage 115,

i.e., the closest distance between elements of adjacent stages is not much greater than the distance between electrodes within the same stage. Typically, the inter-stage distance d_2 between collector electrode 112 and corona discharge electrode 113 of the adjacent stage should be between 1.2 and 2.0 times that of the intra-stage spacing distance d_1 between corona discharge electrode 106 and collector electrode 112 (or spacing between corona discharge electrode 113, and collector electrode 111) within the same stage. Because of this consistent spacing, capacitance between electrodes 106 and 112 and between 106 and 113 are of the same order. Note that, in this arrangement, the capacitance coupling between corona discharge electrodes 106 and 113 may allow some parasitic current to flow between the electrodes. This parasitic current is of the same order of amplitude as a capacitive current between electrode pair 106 and 112. To decrease unnecessary current between electrodes 113 and 106, each should be supplied with synchronized high voltage waveforms. In the embodiment depicted in Figure 1A both EFA stages are powered by a common power supply 105 *i.e.*, a power supply having a single voltage conversion circuit or “converter” (*e.g.*, power transformer, rectifier, and filtering circuits, etc.) feeding both stages in parallel. This ensures that the voltage difference between electrodes 106 and 113 is maintained constant relative to electrodes 106 and 111 so that no or only a very small current flows between electrodes 106 and 113.

Please replace paragraph [0024] with the following amended paragraph:

[0024] Figure 1B shows an alternate configuration of an EFA 101 including a pair of EFA stages 116 and 117 powered by separate converters in the form of power supplies 102 and 103, respectively. First EFA stage 116 includes corona discharge electrode 107 and collecting electrode 108 forming a pair of complementary electrodes within stage 116. Second EFA stage 117 includes corona discharge electrode 109 and collecting electrode 110 forming a second pair of complementary electrodes. Both EFA stage 116, 117 and all electrodes 107-110 are shown schematically.

Please replace paragraph [0029] with the following amended paragraph:

[0029] Referring to Figure 3, a two stage EFA 300 includes a pair of converters in the form of HVPSs 301 and 302 associated with respective first and second stages 312 and 313. Both stages are substantially identical and are supplied with electrical power by identical HVPSs 301 and 302. HVPSs 301 and 302 include respective pulse width modulation (PWM) controllers 304 and 305, power transistors 306 and 307, high voltage inductors 308 and 309

(*i.e.*, transformers or filtering chokes) and voltage doublers ~~301 320~~ and ~~302 321~~, each voltage doubler including rectifier circuits 310 and 311. HVPSs ~~320 301~~ and ~~321 302~~ provide power to respective EFA corona discharge electrodes of stages 312 and 313. As before, although EFA electrodes of stages 312 and 313 are diagrammatically depicted as single pairs of one corona discharge electrode and one accelerator (or attractor) electrode, each stage would typically include multiple pairs of electrodes configured in a two-dimensional array. PWM controllers 304, 305 generate (and provide at pin 7) high frequency pulses to the gates of respective power transistors 306 and 307. The frequency of these pulses is determined by respective RC timing circuits including resistor 316 and capacitor 317, and resistor 318 and the capacitor 319. Ordinarily, slight differences between values of these components between stages results in slightly different operating frequencies of the two HVPS stages which typically supply an output voltage within a range of 50 Hz to 1000 kHz. However, even a slight variation in frequency leads to non-synchronous operation of stages 312 and 313 of EFA 300. Thus, to ensure the synchronous and syn-phased (*i.e.*, zero phase shift or difference) operation of power supplies 301 and 302, controller 305 is connected to receive a synchronization signal pulse from pin 1 of the PWM controller 304 via a synchronization input circuit including resistor 315 and capacitor 314. This arrangement synchronizes PWM controller 305 to PWM controller 304 so that both PWM controllers output voltage pulses that are both synchronous (same frequency) and syn-phased (same phase).

Please replace paragraph [0031] with the following amended paragraph:

[0031] For the purposes of illustration, we assume that all voltages and components thereof (*e.g.*, a.c. and d.c.) applied to the electrodes of neighboring stages 414 and 415 are equal. It is further assumed that high voltages are applied to the corona discharge electrodes 401 and 403 and that the collecting electrodes 402 and 404 are grounded, *i.e.*, maintained at common ground potential relative to the high voltages applied to corona discharge electrodes 401 and 403. All electrodes are arranged in parallel vertical columns with corresponding electrodes of different stages horizontally aligned and vertically offset from the complementary electrode of its own stage in staggered columns. A normalized distance 410 between corona discharge electrodes 401 and the leading edges of the closest vertically adjacent collecting electrodes 402 is equal to $aN1$. Normalized distance $aN2$ (413) between corona electrodes 403 of the second stage and the trailing edges of collecting electrodes 402

of the first stage should be some distance a_{N2} greater than a_{N1} , the actual distance depending of the specific voltage applied to the corona discharge electrodes. In any case, a_{N2} should be just greater than a_{N1} , *i.e.*, be within a range of 1 to 2 times distance a_{N1} and, more preferably, 1.1 to 1.65 times a_{N1} and even more preferably approximately 1.4 times a_{N1} . In particular, as depicted in Figure 4A, distance a_{N2} should be just greater than necessary to avoid a voltage between the corona onset voltage creating a current flow therebetween. Let us assume that this normalized "stant" distance a_{N2} is equal to $1.4 \times a_{N1}$. Then the horizontal distance 412 between neighboring stages is less than distance a_{N2} (413). As shown, intra-stage spacing is minimized when the same type of the electrodes of the neighboring stages are located in one plane 420 (as shown in Figure 4A). Plane 414 may be defined as a plane orthogonal to the plane containing the edges of the corona discharge electrodes (plane 417 which is also substantially orthogonal to an airflow direction as shown in Figure 4A). If the same type electrodes of neighboring states are located in different but parallel planes, such as planes 421 and 422 (as shown in Figure 4B), the resultant minimal spacing distance between electrodes of adjacent EFA stages is equal to a_{N2} as shown by line 419. Note that the length of line 419 is the same as distance 413 (a_{N2}) and is greater than distance 412 so that inter-stage spacing is increased.